

Optical Storage

Aimee Duarte and Janis McGuirl
Cranston Area Career & Technical Center

Introduction

Purpose:

The purpose of this core learning experience is to introduce students to the topic of optical storage. They will have the opportunity to learn how this technology works, see how it is being used in industry and research on its future.

Core Objective-overall objective for core learning experience:

1. Individual Experience: How CD and DVD drive works
2. Individual Experience: Differences in optical media and how it works
3. Integration Experience: Future of storage technology
4. Group Experience: Interviewing organizations

Estimated Time: 2 weeks (8 42 minutes periods each week)

Standards

The following standards are addressed by this core learning experience:

New Standards Performance Standards:

E1c. The student reads and comprehends informational materials to develop understanding and expertise and produces written or oral work that:

- **restates or summarizes information;**
- **relates new information to prior knowledge and experience;**
- **extends ideas;**
- **makes connections to related topics or information.**

E2a. The student produces a report that:

- engages the reader by establishing a context, creating a persona, and otherwise developing reader interest;
- develops a controlling idea that conveys a perspective on the subject;
- creates an organizing structure appropriate to purpose, audience, and context;
- **includes appropriate facts and details;**
- **excludes extraneous and inappropriate information;**
- **uses a range of appropriate strategies, such as providing facts and details, describing or analyzing the subject, narrating a relevant anecdote, comparing and contrasting, naming, explaining benefits or limitations, demonstrating claims or assertions, and providing a scenario to illustrate;**
- provides a sense of closure to the writing.

E3a. The student participates in one-to-one conferences with a teacher, paraprofessional, or adult volunteer, in which the student:

- initiates new topics in addition to responding to adult-initiated topics;
- **asks relevant questions;**
- **responds to questions with appropriate elaboration;**
- uses language cues to indicate different levels of certainty or hypothesizing, e.g., "what if...," "very likely...," "I'm unsure whether..."
- **confirms understanding by paraphrasing the adult's directions or suggestions.**

A2a. The student makes an oral presentation of project plans or findings to an audience with expertise in the relevant subject matter; that is, the student:

- **organizes the presentation in a logical way appropriate to its purpose;**
- **adjusts the style of presentation to suit its purpose and audience;**
- speaks clearly and presents confidently;
- **responds appropriately to questions from the audience;**
- **evaluates the effectiveness of the presentation and identifies appropriate revisions for a future presentation.**

A2b. The student prepares a formal written proposal or report to an organization beyond the school; that is, the student:

- **organizes the information in the proposal or report in a logical way appropriate to its purpose;**
- produces the proposal or report in a format similar to that used in professionally produced documents for a similar purpose and audience.

A2c. The student develops a multi-media presentation, combining text, images, and/or sound; that is, the student:

- selects an appropriate medium for each element of the presentation;
- uses the selected media skillfully, including editing and monitoring for quality;
- **achieves coherence in the presentation as a whole;**
- **communicates the information effectively, testing audience response and revising the presentation accordingly.**

A3a. The student gathers information to assist in completing project work; that is, the student:

- identifies potential sources of information to assist in completing the project;
- uses appropriate techniques to collect the information, e.g., considers sampling issues in conducting a survey;
- **interprets and analyzes the information**
- **evaluates the information in terms of completeness, relevance, and validity;**
- shows evidence of research in the completed project.

A3b. The student uses on-line sources to exchange information for specific purposes; that is, the student:

- uses E-mail to correspond with peers and specialists in the subject matter of their projects;
- incorporates into E-mail correspondence data of different file types and applications.

A5a. The student participates in the establishment and operation of self-directed work teams; that is, the student:

- **defines roles and shares responsibilities among team members;**
- **sets objectives and time frames for the work to be completed;**
- **establishes processes for group decision making;**
- **reviews progress and makes adjustments as required.**

ITEA Standards:

1. Students will develop an understanding of the characteristics and scope of technology.

K. The rate of technological development and diffusion is increasing rapidly.

L. Inventions and innovation are the results of specific, goal-directed research.

2. Students will develop an understanding of the core concepts of technology.

CC. New Technologies create new processes.

8. Students will develop an understanding of the attributes of design.

H. The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, communicating processes and results.

Writing Development Rubric

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
IDEAS/CONTENT	Writing is purposeful with logic maintained throughout	Maintains clear logical subject/position	Subject/position is vague with no unifying statement; Drifts or has lapses in logic;	Insufficient writing to show that criteria are met
SUPPORT	All major points fully developed and supported evenly by specific detail throughout the paper (e.g., explanation, evidence, examples, figures, tables, and/or graphs); Supporting evidence is understandable and well-organized	All key points developed and supported by specific detail; some key points may be less developed than others (not even or balanced); Supporting evidence illustrates the key points but lacks depth	Some key points are developed by specific detail; some may be general and some may lack depth; Supporting evidence is minimal and/or not easily interpreted	Insufficient or repetitious writing that fails to develop key points-Lacks supporting evidence and/or supporting evidence is unrelated to key points
ORGANIZATION	Structure is clear, appropriate and effective; All paragraphs are appropriate and purposeful; Coherence (paragraph to paragraph) and cohesion (sentence to sentence) are effectively demonstrated throughout paper; All points are logically presented and interrelated	Structure is clear and appropriate to purpose; Most major points are appropriately paragraphed; Coherence (paragraph to paragraph) and cohesion (sentence to sentence) are demonstrated with appropriate transitions; Most points logically presented and organized	Structure is evident; May have inappropriate or intrusive transitions that disrupt the progression of ideas; Some major points appropriately paragraphed; Has coherence (paragraph to paragraph) but lacks cohesion (sentence to sentence) or vice versa; May have one or more minor digressions	Structure is missing or attempted but not obvious to the reader; Limited evidence of appropriate paragraphing; Little structure within paragraphs; May have one or more major digressions
FOCUS (applies to theses, term papers, and essays)	Clearly sets purpose of paper through introduction or overview; Effective conclusion that relates to introduction and unifies the writing	Clearly sets purpose of paper through introduction or overview; Clear conclusion	Subject/position identified by only a brief, general introductory statement; Conclusion is absent or only a verbatim reiteration of the introduction	Subject/position (or issue) is unclear

Writing Development Rubric - Continued

Scale Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
SENTENCE AND PARAGRAPHS	Usage of sophisticated sentence patterns; Paragraphs indicate shift in thought and are used to make sequence of events clear	Simple and some complex sentences are used; Some paragraphing to show sequence of events/ideas	Sentence structure is usually correct; Simple sentences are used; Little attempt made to paragraph writing	Sentences do not make sense; No paragraphing
WORD CHOICE	Words are used correctly and precisely	Acceptable vocabulary; Words are technologically appropriate	Simple vocabulary	Incorrect vocabulary
SPELLING	Spelling is correct including complex and irregular words	Spelling is correct	Frequent spelling errors	Spelling errors interfere with understanding
PUNCTUATION	A range of punctuation including commas, apostrophes, colons; and semicolons is used accurately and effectively	Periods and capitals are used correctly and punctuation is beginning to be used within sentence	Frequent punctuation errors	Insufficient or lacks punctuation; Incorrect use of capital letters

Oral Presentation Rubric

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
ACCURACY	The student summarizes the meaning of complex material accurately	The student summarizes content accurately. His/her summaries contains no distortions, inaccurate details, or misleading information of what was read or heard	The student makes few inaccuracies in summarizing information	The student makes inaccuracies in summarizing information
RELEVANCY	The student includes all information necessary to communicate the meaning of complex content clearly and completely. The student excludes unnecessary information (extraneous, irrelevant, or of minor importance)	The student includes all information necessary to communicate the content clearly and completely. The student excludes unnecessary information (extraneous, irrelevant, or of minor importance)	Student includes most of the important information, along with a few irrelevant details	The student includes little of the important information in summary
EXPRESSED IN OWN WORDS	The student summarizes complex material in his/her own words	The student summarizes in his/her own words	The student uses a combination of own words and those of the source, e.g., verbatim from a textbook	The student summarizes content word-for-word from its source (text, speaker)
COHESIVENESS	The student is able to summarize complex material by relating all the concepts and details in a logical manner	The student presents information in a cohesive manner; all the information fits together in a logical manner	The student summarizes content in which some details and concepts fit together in a cohesive (logical) manner, while other details and concepts appear disconnected or unrelated	The student presents a list of unrelated details

Oral Presentation Rubric - Continued

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
APPROPRIATENES S IN TERMS OF AUDIENCE AND PURPOSE	With short notice, the student modifies (content, language, and length) his/her summary so that it is appropriate for the audience	The student modifies his/her summaries according to the context/situation in which the summary is given. He/she adjusts content, language, and length so that his/her summary is appropriate for the audience and intended purpose	The student modifies his/her summary to a limited degree to meet the needs of different audiences	The student summarizes in a rigid manner. Regardless of the audience or purpose, the student gives the same summary

Multimedia Rubric

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
Overall Presentation	Project does not flow at all, is poorly presented, and has no interest	Majority of project is disjointed and interest level is sporadic	Project flows well and is interesting	The project flows well, keeps the attention of the audience and is very interesting.
Text Information	Information is missing, and grammar and punctuation is misused.	Text information is short and inaccurate. Grammar and punctuation are mostly correct.	Majority of the text is accurate, uses proper grammar and punctuation, and flows well.	The information used is accurate, well written, complete with proper grammar and punctuation.
Graphics and scanned images	No graphics or scanned images used	Images enhance the information somewhat. Placement of images is acceptable.	Images are used to enhance the information and support the text. Placement of images is appropriate.	Images are used to enhance the information and support text. Placement of images is pleasing to the eye.

Teamwork Rubric

Scale/Criteria	needs to work substantively in this area in order to meet the standard 1	shows progress toward the standard 2	meets the standard 3	exceeds the standard 4
GROUP PARTICIPATION	All students enthusiastically participate	At least ¾of students actively participate	At least half the students confer or present ideas	Only one or two people actively participate
SHARED RESPONSIBILITY	Responsibility for task is shared evenly	Responsibility is shared by most group members	Responsibility is shared by ½ the group members	Exclusive reliance on one person
QUALITY OF INTERACTION	Excellent listening and leadership skills exhibited; students reflect awareness of others' views and opinions in their discussions	Students show adeptness in interacting; lively discussion centers on the task	Some ability to interact; attentive listening; some evidence of discussion or alternatives	Little interaction; very brief conversations; some students were disinterested or distracted
ROLES WITHIN GROUP	Each student assigned a clearly defined role; group members perform roles effectively	Each student assigned a role but roles not clearly defined or consistently adhered to	Students assigned roles but roles were not consistently adhered to	No effort made to assign roles to group members

Core Learning Experience Summary Chart

Student Tasks & Instructional Methodology for Each Learning Experience		
Student Learning Experiences	Student Tasks	Instructional Methodologies
Learning Experience I Discover how CD and DVD drive work	1. participate in class discussion 2. Read article 3. Answer questions regarding article	1. Discuss with students topic of optical storage 2. Review article with class 3. Show video clip (or equivalent) on how drives work.
Learning Experience II Learn the differences in optical media and how it works	1. participate in class discussion 2. Find article on internet explaining process 3. participate in group activity to share findings	1. Discuss optical media 2. Oversee internet research for explanations
Learning Experience III Research for the future of storage technology	1. Work in teams 2. Research for trends and projections of storage technology 3. Create presentation	1. Oversee teams and help with research and presentations
Integrative/Review Experience	1. Design interview questions 2. Choose organization/person to interview 3. Do interview 4. Create presentation on their findings	1. Question students to develop Interview Questions 2. Oversee development of project

Description of Core Assessment: product & performance
Students will be assessed with rubrics on their teamwork, oral presentations, multimedia presentation and writing.

Student Learning Experience 1

Purpose: To have students discover how CD and DVD drives work

Estimated Time: 1- 2 42-minute class period.

Standards: E1c (reading), E2(writing),
ITEA: 1k

Key Concepts Addressed: How CD and DVD drives work

Student Tasks:

1. Participate in class discussion
2. Read article
3. Answer questions regarding article

Explanation of how learning tasks require higher-level thinking:

Students will participate in a class discussion regarding optical drives. Topics such as types, specifications, what has changed over the years, and what will the future demand will be discussed. Students may form groups to further discuss these topics.

Teacher Responsibilities:

1. Discuss with students topic of optical storage
2. Review article with class
3. Show video clip (or equivalent) on how drives work.

Materials & Equipment:

Computer with Internet access, an article discussing optical drives (optional: CD from the book called How Computers Work), word processor.

Resources:

How Computer Work by Ron White
Computer Concepts by Course Technology

Student Learning Experience 1 Appendix

Optical-Drive compatibility article can be found in the PC Magazine dated January 18, 2000.

Student Learning Experience 2

Purpose: Students will learn the differences in optical media and how it works.

Estimated Time: 1 - 2 42-minute class period

Standards:

E1c (reading), E2(writing), A3b(on-line resources)

ITEA

1. K and L.
2. CC
8. H

Key Concepts Addressed: How CD's are created and work

Student Tasks:

1. participate in class discussion
2. Find article on internet explaining process
3. participate in group activity to share findings

Explanation of how learning tasks require higher-level thinking:

Students will be participating in a class discussion about the optical technology. They will do research on the Internet to find articles to support their discussion. Topics such as the pros and cons of this technology as well as who or what is the driving force behind the changes in this media.

Teacher Responsibilities:

1. Discuss optical media
2. Oversee internet research for explanations

Materials & Equipment:

Computer with Internet access, relevant article on optical media.

Resources:

How Computers Work by Ron White - CD

Student Learning Experience 2 Appendix

How Computers Work by Ron White – section on CD media

Student Learning Experience 3

Purpose: To research the future of optical media/storage technology

Estimated Time: 4 42-minute class periods for research and presentation development. Outside class time may be required. 1 – 2 42-minute class periods for presentations.

Standards:

E1c (reading), E2(writing), A3b (on-line resources), A2a (oral presentation), A2b (written report), A2c (develops a multi-media presentation)

ITEA

1. K and L.
2. CC
8. H

Key Concepts Addressed:

Optical and Storage technology future

Student Tasks:

Working in teams

Using the Internet and other resources to find information on trends and projections for the computer storage technology future. What storage technologies might we use in the future: optical storage cubes, smart credit cards, and holograms?

Explanation of how learning tasks require higher-level thinking:

Students will be researching and brainstorming to find information on the future of storage technology.

Teacher Responsibilities:

1. Oversee teams and help with research and presentations

Materials & Equipment:

Computer with Internet access, word processor, presentation software, journals, library access

Resources:

Core Assessment

Estimated Time: 7 hours (includes time for presentations)

Student Tasks (product and performance):

Students will be divided into teams. Each team will choose an organization and interview the person in charge of maintaining the data. Teams will use the questions agreed upon in class and then create a presentation on their findings

Explanation of How Assessment Tasks Require Higher Level Thinking:

Students will interview a person at a chosen organization and find out their approach to data storage. Students will discover that organizations take different approaches to data storage, depending on the volume of their data, the value of their data, and the need for data security.

Teacher's Responsibilities:

1. Teacher leads class in development of interview questions
2. Teacher oversees development of student projects

Materials & Equipment: Computer with internet access, article on optical drives, CD from “How Computers Work”, and a word processing program

Resources: See Above